

## **THREADED PIPE FITTING WITH RECESSED THREAD ROOTS**

by

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### **FIELD OF THE INVENTION**

This invention relates generally to pipe fittings and, more specifically, to threaded pipe fittings.

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### **BACKGROUND OF THE INVENTION**

A common problem with the use of threaded pipe fittings, especially with non-metallic female threaded pipe fittings, is cracking which originates in the threads. A common cause of such cracking is the impingement of the crests of male threaded fittings with the roots of the female threaded fitting.

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In the prior art, the impingement of crests and roots have attempted to be minimized by truncating the crests on the threads of the male fitting and by providing a female

fitting with rounded off roots. The theory for this is that any infringement of the non-sharp crests and roots would cause minimized stress in the roots -- and therefore less cracking. This technique has not proved reliable. Externally threaded male fittings marketed as having truncated crests frequently have crests which have insufficient or non-existent truncations.

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Accordingly, there is a need for pipe fittings which avoid the aforementioned problem in the prior art.

### SUMMARY

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The invention satisfies this need. The invention is a pipe fitting having a body with an internal bore of a specific nominal diameter. The internal bore is threaded with internal bore threads. The internal bore threads have sides, crests and roots. The sides are disposed at a specific angle  $\phi$ . The roots are recessed such that, when an externally threaded pipe having (i) the same nominal diameter as the bore of the pipe fitting body, and (ii) external threads with sides disposed at the same specific angle  $\phi$  and with sharp crests is disposed within the bore of the pipe fitting body, the sharp crests of the external threads do not impinge upon the roots of the internal threads.

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### DRAWINGS

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These and other features, aspects and advantages of the present invention will become better understood with reference to the following description, appended claims and accompanying drawings where:

Figure 1 is a perspective view of a female pipe fitting having features of the invention;

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Figure 2 is a cross-sectional view of the pipe fitting illustrated in Figure 1;

Figure 3 is a detailed view of threads of pipe fittings in the prior art;

Figure 4 is a detailed view of pipe threads having features of the invention;

Figure 5 is a further detailed view of a single pipe thread root having features of the invention; and

Figure 6 is a second detailed view of a pipe thread root having features of the invention.

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### **DETAILED DESCRIPTION**

The following discussion describes in detail one embodiment of the invention and several variations of that embodiment. This discussion should not be construed, however, as limiting the invention to those particular embodiments. Practitioners skilled in the art will recognize numerous other embodiments as well.

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The invention is a pipe fitting **10** having a body **12** and an internal bore **14** of a specific nominal diameter. The internal bore **14** is threaded with internal bore threads **16**. The internal bore threads **16** have sides **18**, crests **20** and roots **22**. The sides **16** are disposed at a specific angle  $\phi$ .

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Figure 1 illustrates the internally threaded pipe fitting **10** as it would be mated to an externally threaded pipe **24**.

Figure 2 is a cross sectional diagram illustrating how the internally threaded pipe fitting **10** can be mated with the externally threaded pipe **24**.

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Figure 3 is a diagrammatic detail illustration of the internal threads **116** of an internally threaded pipe fitting **110** of the prior art showing it mated with the external threads of an externally threaded pipe **124**. As can be seen in Figure 3, prior art threads **116** and **126** can have sharp crests **120** and **130** and roots **122** and **131** or slightly truncated crests **120** and **130** and roots **122** and **131**.

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Figure 4 illustrates one embodiment of the invention wherein the roots **22** of the internally threaded pipe fitting **10** are recessed such that, when an externally threaded pipe **24** having (i) the same nominal diameter as the bore **14** of the pipe fitting **10**, and (ii) external threads **26** with sides **28** disposed at the same specific angle  $\phi$  and with sharp crests **30** is disposed within the bore **14** of the pipe fitting **10**, the sharp crests **30** of the external threads **26**

do not impinge upon the roots **22** of the internal threads **16**. By this design, it is impossible for the crests **30** of the externally threaded pipe **24** to impinge upon the roots of the internally threaded pipe fitting **10**, even if the crests **30** of the externally threaded pipe **24** are sharp.

This is illustrated in Figures 5 and 6. Figure 5 illustrates one embodiment of the invention

5 wherein each of the roots **22** of the internally threaded pipe fitting **10** has a base **32** which is rounded. Figure 6 illustrates another embodiment of the invention wherein each of the roots **22** of the internally threaded pipe fitting **10** has a base **32** which is generally flat.

Typically the clearance **34** between the roots **22** of the internally threaded pipe fitting **10** and the sharp crests **30** of an externally threaded pipe **24** disposed within the bore **14**  
10 is less than about 0.03 inches in depth.

Because of the recessed roots of the invention, and the impossibility of impingement against the roots, stress induced cracks caused by impingement against the roots is eliminated.

Having thus described the invention, it should be apparent that numerous  
15 structural modifications and adaptations may be resorted to without departing from the scope and fair meaning of the instant invention as set forth hereinabove.